

At The Crossroads of Science and Faith: An Astronomy Curriculum

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"Astronomy compels the soul to look upwards and leads us from this world to another."

–Plato, *The Republic*

Inspiration and Vision

When I (Susan) was a child, my parents handed me a flashlight at the Grand Canyon, expecting me to light their path. Instead I pointed it upwards, asking them to identify the stars in the sky. I can't recall a time when I was not interested in studying the heavens, and although I grew up in a Christian home, my parents did not dissuade me from doing so. They encouraged my interest in math and science while also affirming God's sovereignty. I never questioned the integration of my faith with my study of astronomy, as I always viewed my interpretation of the world around me through the lens of God as the Creator. Unfortunately, this is not the experience of many children in Christian homes today.

After completing my doctorate in planetary astronomy and becoming a research scientist, professor, and mother, I became even more sensitive to the influence that parents and communities have on their children. This is obviously good; however, as children age it is important for them to learn how to evaluate for themselves the information they encounter in the world around them instead of avoiding the tough questions. It is easy to fall into the trap of teaching children *what* to think, instead of training them *how* to think based on a set of biblical principles. My search for training resources found them inadequate, especially when it came to science.

A few years after I finished graduate school, one of my graduate advisors contacted me about a new online homeschool program, Freedom Project Education (FPE), which was looking for a physics teacher who was willing to include a discussion of faith as part of the curriculum. Although my free time was limited, I was intrigued and ended up taking the position, offering one course a semester.

The first year I had three students; the next year, ten; and the following year, thirteen. Using Adobe Connect as our "classroom," I spent a few lectures each semester talking with my students about worldview and how it influences or colors our understanding of everything else in life. Each student had a microphone, enabling discussion. I assigned my students a project each semester that required them either to investigate the worldview of scientists or to critically analyze specifically chosen science fiction books that integrated a particular worldview with physics- or astronomy-related content. I also required them to identify their own worldview, to determine whether their worldview agreed with or differed from that of the book, author, or scientist, and to critically discuss the various perspectives. My students wrote papers and presented their work to the class in an oral presentation. (They submitted their slides to me, and I put them in control of the "classroom." They are not seen, but are heard by their fellow classmates. After the presentation, the students ask questions.) The feedback I received from my students and their parents was very positive. I was especially thrilled when a student told me during online "office hours," that he had never really considered God, and that the project had encouraged him to think more seriously about his life convictions.

Susan Benecchi earned her PhD in planetary astronomy at MIT. She is a Senior Scientist at the Planetary Science Institute and an instructor with Freedom Project Education.

Gladys Kober earned an MA in astrophysics in Brazil and was on the staff of the Planetarium of Rio de Janeiro. She is now a data analyst in astronomy at NASA's Goddard Space Flight Center in Greenbelt, Maryland, and an adjunct faculty member at Montgomery College.

Paula Gossard is a professor of science and science education at Cairn University. She has a MEd from George Mason University, and earned her PhD at the University of Southern Mississippi.

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At about the same time, I was contacted by Gladys Kober about providing an interview concerning the new textbook, *The Crossroads of Science and Faith: Astronomy through a Christian Worldview* (figure 1), that she and Ashley Zauderer had started working on. They had found my contact information through a Christian astronomers' mailing list to which we all belonged. I provided the interview, but also commented to them that I would love to be more involved with the project if they were interested; we also discovered that we were all located in the Washington, DC, area. Gladys and I met at a local coffee shop, and she shared with me their vision for the textbook and the special concerns they hoped to address. I was thrilled, since it was a dream of mine from childhood to be involved in such a publication.

A Calling for Gladys

Some time earlier, Gladys had been introduced to Ashley through a mutual friend; they began working together, presenting workshops for homeschool moms about how to relate scientific discoveries in astronomy to the Christian faith. The workshops were well received, but the same question arose repeatedly: where is the textbook to help us teach this

material? At the time, it did not occur to Gladys that she would be inspired to write a textbook; however, it was not long before God began to lay the foundation for the project.

Gladys is from Brazil and travels there yearly to visit her family. Brazil is a country where few books are available about science and faith, and even fewer are written in the native Portuguese language. Gladys had been involved in getting Fred Heeren's book *Show Me God*¹ published in Portuguese; she began to wonder about publishing other such books. However, based on her previous experience of the significant investment in time required to get one book translated (contacting the author and publisher, translating the book, making sure that all technical terms had been correctly translated, and then producing the final product), she considered whether it might not be easier to write similar books directly in Portuguese. Feeling convicted about the idea, she said a simple prayer:

God, writing a book is an enormous investment of time, and I don't feel this is my gift. There is no way I will attempt to write a book, unless you are very clear that this is what you want me to do. The only

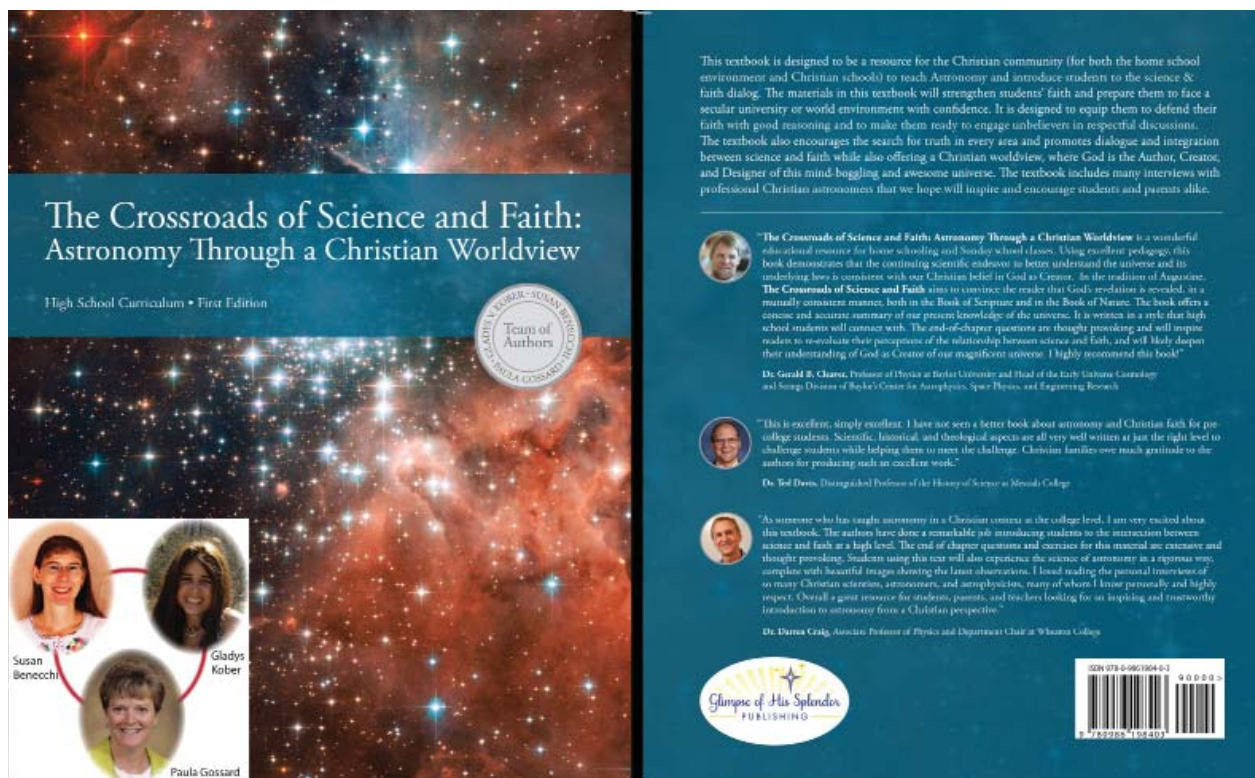


Figure 1. Textbook cover with inset of photos of the co-authors. The first printing was in March 2015. This one-year curriculum contains two parts. Part I is an introduction to the science and faith dialogue. Part II focuses on astronomy as a scientific discipline.

way I would invest so much time in writing a book is if I'm sure it is from you.

While Gladys was in Brazil feeling God's conviction to work on a book, a friend in the US was praying for her, and felt strongly that God was telling her to contact Gladys about writing an astronomy textbook in English for homeschoolers. They met when Gladys returned to the USA, and the coincidence was too great to ignore. Although it was not what Gladys had in mind, the more she thought and prayed about it, the more it made sense. The homeschool moms had been asking her for such a textbook. Knowing that she had the gift of teaching, she reasoned that writing a textbook was really an extension of her teaching expertise; thus, the textbook project was born. Although the project took 4-5 years to complete, she realizes, in retrospect, that when the journey is long, if the vision is from God, he will give the strength and motivation to keep moving forward despite times of discouragement. Gladys testifies

that "when God calls, he equips and provides all the help we need."

The Textbook

We felt a strong calling to help parents bridge the gap between science and faith. The textbook has a dual focus. The first part focuses on science/faith issues. We introduce students to a wide variety of worldviews, with the aim of helping students to identify their personal worldview. We discuss the search for truth from both a scientific and a religious perspective, with the desired outcome that students would understand the importance of dialogue and integration between the two, instead of conflict or independence (figure 2).² The section also provides a guide for helping students to develop logical arguments while avoiding common logical fallacies, enabling them to examine and defend their personal faith and worldview with sound reasoning. In addition, it provides students with tools to better relate their beliefs to what they learn about science.

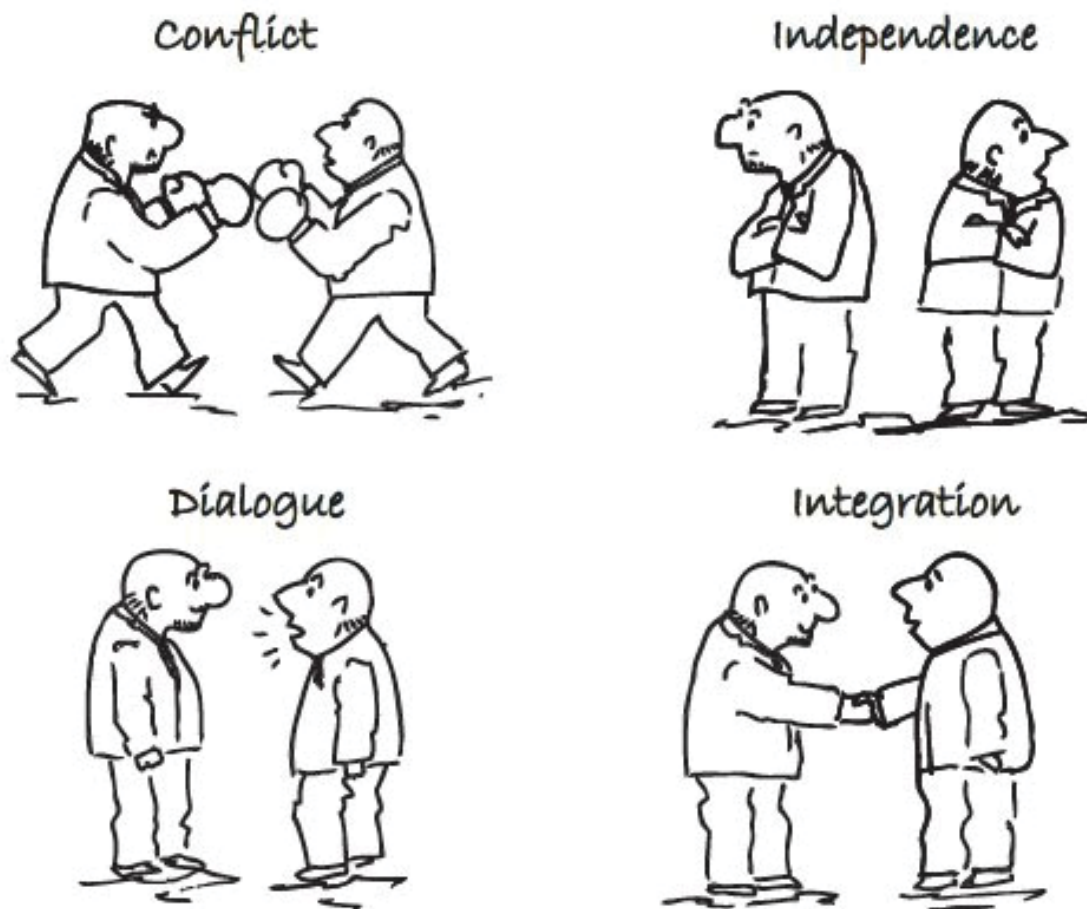


Figure 2. Barbour's four views (Conflict, Independence, Dialogue and Integration) that categorize relationships between science and faith. Our aim is that students, and Christians in general, move from viewing modern scientific inquiry and faith as either in conflict or independent from each other, to viewing them as partners for dialogue and integration.

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The second part of the book presents the discipline of astronomy through a typical scientific understanding. The unique part of this section is the inclusion of interviews with professional astronomers who also hold a Christian worldview. The interviews include a combination of personal testimonies plus advice for students who might be interested in pursuing careers in astronomy or other science, technology, engineering, and math (STEM) fields. Many of these same professionals reviewed our chapters for scientific accuracy. When Gladys shared this vision with me, I was very interested and immediately began working on the astronomy chapters.

As an astronomer, I focused on reviewing and writing a few of the astronomy chapters. Gladys then met Paula Gossard, a Christian professor of science and science education, at an American Scientific Affiliation (ASA) annual meeting, and Paula was brought on board to edit and improve the science/faith chapters.

Gladys and I tried to meet monthly to discuss our progress, although we never set a specific deadline for completing the book. We had also decided to self-publish because we wanted to define the content of the book instead of being beholden to a particular textbook company's desires.

We view that parents are looking for curricula that will help their children to become mature adults, adhering to the faith of their upbringing, and that will teach them how to discuss their beliefs in relation to many current scientific discoveries. To add to a perceived polarization of science and faith, a few scientists have included an atheistic worldview along with their teaching of science as if it were part of science itself. As a result, many parents avoid materials they consider controversial, and students later come to believe that they must choose between science and their faith.³ The keys to bridging this gap are professional astronomers who hold to a Christian worldview and who can speak both languages, understanding the complexities of both communities.

The role of science educators should be to teach science and to help students to recognize different worldviews, but not to impose their own personal worldview on their students. Science is well received by Christians when it is presented not as a threat to faith, but rather as a complementary way to understand God, leading to a more integrated view of

reality. We determined that the book should provide students with the following:

1. An understanding of the relationship between faith and science with the goal of helping students to identify and integrate their own worldview;
2. Accurate astronomical information;
3. Inspiring testimonies and advice from professional astronomers who have wrestled with science/faith issues and have found a coherent relationship between the two;
4. Exercises to encourage precise thinking about faith and science and how they interact.

In the summer of 2014, we recognized that the book was close to completion. Knowing that homeschoolers are most likely to adopt new curricula at the beginning of a school year, we set a goal of going to press early in 2015 so that we could market the book for the 2015–2016 school year. We found a local printer in Baltimore and planned to debut the textbook at two homeschool conventions: (1) The Midwest Homeschool Convention, April 9–11, 2015, in Cincinnati, Ohio (figure 3) and (2) the local



Figure 3. Gladys presenting our textbook at the Midwest Homeschool Convention, April 9–11, 2015, in Cincinnati, Ohio.

Maryland State Home School Curriculum Fair, April 24–25, 2015. Gladys attended the first and we both attended the second.

As self-publishers, it was gratifying to see the proof copy of the textbook at the end of March 2015, although I think we were surprised at the thickness of the book. In November 2015, I presented the textbook at the Education session of the Division of Planetary Sciences meeting with excellent feedback from the professional astronomy community. We would like to present it at many more education material and homeschool conventions, but our resources are limited.

In the 2016–2017 school year, I will be using our textbook as the basis for my online homeschool astronomy class with FPE.

We have provided evaluation copies of the textbook to various homeschool materials distributors, to pastors, and to leaders of scientific organizations with faith-related components. In addition, Paula hopes to have the textbook evaluated and potentially supported by Veritas Press as part of her work of developing scientific curriculum for them. Gladys has engaged a number of churches to provide seminars for local congregations. We hope that this textbook will be a resource to help parents who hold tightly to particular ideologies to be less closed to current scientific discovery and more excited about how new discoveries can bolster and enable their faith. We also think that the first part of the book is appropriate for lay people in churches, for pastors, and for seminary students who are interested in science, but are intimidated about how it might affect their faith or ministry opportunities.

More information, sample chapters, and order information for the textbook can be found at: <http://www.GlimpseofHisSplendor.com/>. †

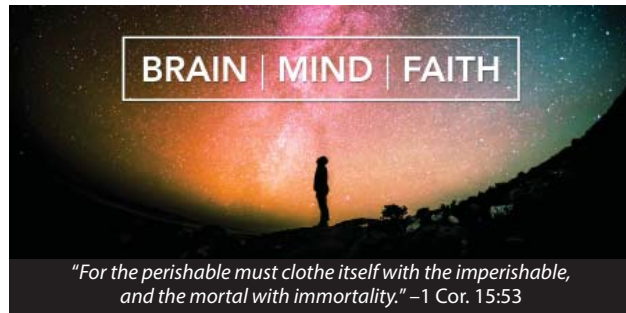
Notes

¹Fred Heeren, *Show Me God: What the Message from Space Is Telling Us about God*, 2nd rev. ed. (Wheeling, IL: Day Star Productions, 2004).

²Ian G. Barbour, *When Science Meets Religion: Enemies, Strangers, or Partners?* (New York: HarperCollins, 2000).

³David Kinnaman, *You Lost Me: Why Young Christians Are Leaving Church ... and Rethinking Faith* (Grand Rapids, MI: Baker Books, 2011).

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Premeeting Workshops

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Five Online Sunday School Lessons on Science and Religion

Denis Lamoureux, Facilitator
Associate Professor of Science & Religion
St. Joseph's College, University of Alberta

This morning workshop is an overview of introductory topics in science and religion that can be used in Sunday schools. Lessons include (1) Beyond the “Evolution” vs. “Creation” Debate, (2) Ancient Science in the Bible, (3) Intelligent Design: Delusion or Divine Revelation? (4) Galileo the Theologian, and (5) Darwin’s Religious Beliefs. The five lessons are online with four hours of audio-slides lectures, handouts, discussion guides, and reading material: <http://www.ualberta.ca/~dlamoure/sswl.html>.



Genomic Biotechnologies in Medicine—What Can Be Done, and What Should Be Done?

Douglas Lauffenburger, Facilitator
Professor of Biological Engineering
Massachusetts Institute of Technology (MIT)

This afternoon workshop will describe the state of, and expectations for, biotechnologies aimed at addressing medical problems in the post-genomic era. Examples include pre-natal genome sequencing, CRISPR-based genome editing, stem cell programming, and gene drive-mediated modulation of environmental pathogens. The ongoing advances in capabilities of these emerging technologies, as well as their continuing technical challenges, will be described, along with an outline of potential ethical, social, and spiritual implications for discussion.

Register at
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